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Distributional and Ecological Notes on Pinus culminicola.—Until recently, Potosí piñon or *pino enano* in Spanish vernacular, *Pinus culminicola* Andresen & Beaman, a high altitude dwarf piñon, was known only from the summit of Cerro Potosí (ca 3600 m) in Nuevo León (24° 53′ 30″ N, 100° 10′ 30″ W) where it was thought to be endemic (Andresen and Beaman, J. Arnold Arbor. 42:437–441, 1961; Beaman and Andresen, Amer. Midl. Naturalist 75:1–33, 1966). However, in 1972, Capó-Arteaga in an unpublished thesis (*Observaciones sobre la taxonomia y distribución de las coníferas de Nuevo León, Mexico.* Tesis, Fac. Ciencias Biol., Univ. Nuevo León, Monterrey, N.L.) and again in a popular Mexican forestry journal (Bosques 9:33, 1972) mentions that he collected the Potosí piñon from the Sierra de la Marta in Nuevo León; no additional information was presented.

Recent collections that substantiate the distribution for *Pinus culminicola* are cited below: Mexico, Coahuila, Mcpo. Arteaga, Sierra de Santa Maria E and S of La Ciruela, 12 Feb 1974, *Patterson 1102* (TEX); Sierra San Antonio, 5 km N of San Antonio de las Alazanas, 8 Oct 1974, *Patterson 32, 33* (TEX); head of Cañon San Antonio de las Alazanas between Sierra San Antonio and Sierra San Antonio de las Alazanas 7.5 km ENE of San Antonio de las Alazanas, 9 Oct 1974, *Patterson 36* (TEX). Nuevo León, Mcpo. Rayones, Sierra de la Marta, 21 Aug 1970, *Capó-Arteaga and Villarreal C. s.n.* (UNL).

The Coahuila-Nuevo León boundary falls along the Sierra de la Marta (also known as S. Santa Marta) axis but Mexican maps vary considerably in the placement of the state boundary. Both the Sierra de la Marta and the Sierra de San Antonio reach elevations in excess of 3400 m and are of a dolomitic limestone bedrock (at least in the upper portions). In addition, both sierras trend east-west and have extensive sheltered north exposures that rise steeply from a 2400 m base elevation. Sierra de la Marta is approximately 25° 13′ N, 100° 23′ W; Sierra San Antonio is 25° 17′ N, 100° 38′ W (fig. 1).

All of the Potosí piñon that we observed is restricted to open rocky sites at high elevations (above 3000 m) in sheltered sites usually but not exclusively on northern exposures. Such sites as the open summits of scarp faces or along high altitude crests of sierras seem to be preferred, e.g., on the Sierra de la Marta. We have also observed *P. culminicola* on shallow rocky soils in open sites within a mixed-conifer forest (S. de la Marta) as well as on open, rocky sites in mixed-conifer parklands (S. de San Antonio). In addition, *P. culminicola* is peripherally associated with an aspect of a high elevation (3000 m +) depauperate, open montane chaparral (sensu Muller, Amer. Midl. Naturalist 21:701–703, 1938) with low, gnarled, deciduous and evergreen scrub oaks, a variety of rosaceous and rhamnaceous shrubs and an *Agave* as the dominant associates (see *Patterson 36*).

In favorable habitats on the Sierra de la Marta, *P. culminicola* is frequently associated with a *Pinus-Pseudotsuga-Abies* community whose dominant species include *Pinus hartwegii, Pinus strobiformis, Pseudotsuga flahaultii,* and *Abies vejarii* (includ-

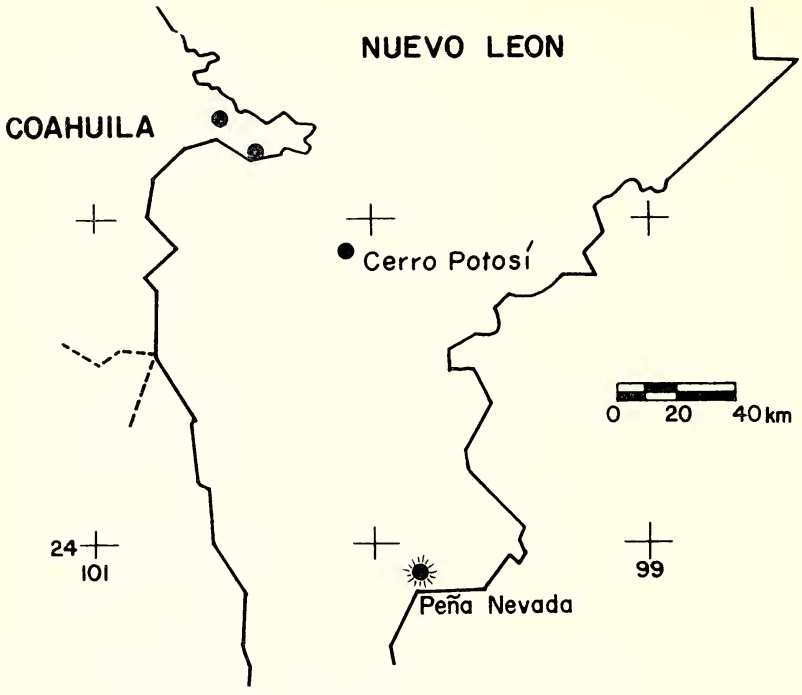

FIG. 1. Distribution of *Pinus culminicola*.

ing var. *macrocarpa*). At the upper limits of the S. de la Marta (3400 m +), *P. culminicola* is more frequently associated with *Picea mexicana* and at the summit of the ridge Potosi piñon grows inclose proximity to a montane chaparral community that dominates the southern slope of the S. de la Marta. *Pinus culminicola* associates either with a *Pinus hartwegii* parkland community or with a *Pinus-Pseudotsuga-Abies* community on favorable sites in the Sierra de San Antonio at elevations in excess of 3200 m.

Although *P. culminicola* was fairly common at each of our collecting sites, we did not observe a well-developed, extensive *P. culminicola* scrub community as described by Beaman and Andresen (Amer. Midl. Naturalist 75:8, 18, 1966) for Cerro Potosí. However, on the northern exposure just below the ridgeline of the S. de la Marta there occurs a relatively homogeneous but discontinuous *P. culminicola* community of perhaps 10 m in width.

We have no evidence to support Beaman and Andresen's (op. cit.: 18, 20) contention that *P. culminicola* is a timberline or subalpine species. There is no indication of a timberline on either S. de la Marta or S. de San Antonio. We observed that *P. culminicola* was most commonly associated with those species that Beaman and Andresen (ibid.: 22) described as occasional associates of the *Pinus hartwegii* forest community at lower elevations on Cerro Potosí. Such an occurrence is no doubt explained by the limited available habitat, with the resultant telescoping of plant communities, on the S. de la Marta and the S. San Antonio, since as Beaman and Andresen (op. cit.) observed, the *P. culminicola* scrub community does merge with the *P. hartwegii* forest community at about 3300–3500 m on Cerro Potosí. Unfortunately, there is a paucity of accurate elevation determinations for most of the sierras of northeastern Mexico and such a handicap makes meaningful comparisons

of elevational range of taxa or indeed communities extremely tenuous. That *P. culminicola* grows in association with an open montane chaparral seems to contraindicate that Potosí piñon is strictly a timberline or subalpine species.

Although we have no quantitative supportive data, *P. culminicola* appears to be a typical ecotonal species, at least in the area that we examined. Potosí piñon appears to colonize (1) the edge between the upper environmental limits of the mixed conifer community and the crest of the Sierra de la Marta, (2) an environmental edge above steep scarp faces on lower (3000 +) northern exposed slopes of the Sierra de la Marta, (3) environmental or edaphic edges (or ecotones) between mixed conifer forests or parklands and other formations such as montane chaparral at high elevations of 3000 m +, and (4) openings at high elevations on sheltered slopes in the mixed conifer forest community usually caused by variation in substratum, i.e., locally rocky sites with thin soils.

The patchy, seemingly unpredictable distribution of the Potosí piñon is not easily understood. Peña Nevada, ca 3400 m, approximately 140 km south of Cerro Potosí (see fig. 1) and approximately 200 m lower in elevation has been surveyed by the authors and does not have *P. culminicola* as a component of its florula (see also Beaman and Andresen, op. cit.: 31).

Nomenclature for *Pinus* is based upon Critchfield and Little (op. cit.); nomenclature for other conifers mentioned in the text is based upon Martinez (*Las Pinaceas Mexicanas,* 3rd ed. Univ. Nac. Autón. de México, 1963). Place names and approximate elevations are based upon the Army Map Service (AMS), Edition 1, 1:250,000, Monterrey Sheet, NG14–7, 1962.

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Bacopa monnieri (Scrophulariaceae), a New Record for California.—A small but well-established population of *Bacopa monnieri* (L.) Wettst. has been discovered: California, Riverside Co., ca 11 km (6.5 mi) SE of Vidal, damp soil on shore of Colorado River at Agnes Wilson Rd., 16 Nov 1974, *Gordon et al. 775* (RSA). This semi-aquatic is widespread in tropical regions throughout the world. In North America it occurs in Texas, thence east to Florida and north to Virginia (Correll and Johnston, *Manual of the vascular plants of Texas,* 1970), and, in western Mexico north to the Sonoran Desert of central Sonora and southern Baja California (Shreve and Wiggins, *Vegetation and flora of the Sonoran Desert,* 1964).

Plants in the new population are locally abundant, forming small mounds among other river-bottom herbs, notably *Aster exilis* Ell., *Eustoma exaltatum* (L.) Griseb., and *Eleocharis coloradoensis* (Britt.) Gilly. The population has existed at the Wilson Road site for at least 5 years; it was first noted on 15 Nov 1969, when it appeared to be at least as firmly entrenched as it is today.

Kearney and Peebles (*Arizona flora,* 1960) reported a 1912 collection by *Pinney* (ARIZ) identified as *Bacopa eisenii* (Kell.) Penn. from the Gila River between Phoenix and Maricopa, Maricopa County, Arizona, approximately 250 km (155 mi) ESE of the Wilson Road site. We have examined these sheets and concur in the identification. Assuming the Arizona colony is still extant, it would represent the closest population of *Bacopa,* geographically, to the Wilson Road population.—Michael H. Grayum and Kenneth A. Wilson, Biology, California State University, Northridge 91324.